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(54) **Chuck**

(57) The centrifugal force on chuck jaws 2 is counteracted by balance weights 16 acting through levers 23 each formed with three spherical surfaces respectively engaging a cylindrical surface 16.3 in the weight, a support surface 29 fixed in the chuck and a mounting 25 in a slider 8 in a portion 2b of the jaw 2. The slider 8 has teeth 17 engaging a forward portion 2a of the jaw. To disengage the portion 2b, enabling the portion 2a to be withdrawn from the chuck, a member 23 is depressed to withdraw the slider 8 by cam action from the portion 2a while the lever slides through the surfaces 16.3 and 29. A spring 14 effects the return movement. End balls in a row thereof in a transverse passage in lever bearing head 23.1 provide a pivot in mounting 25. The jaws 2 are moved radially by a drive member 4 acting through ramps 6, 7 only on portion 2b.

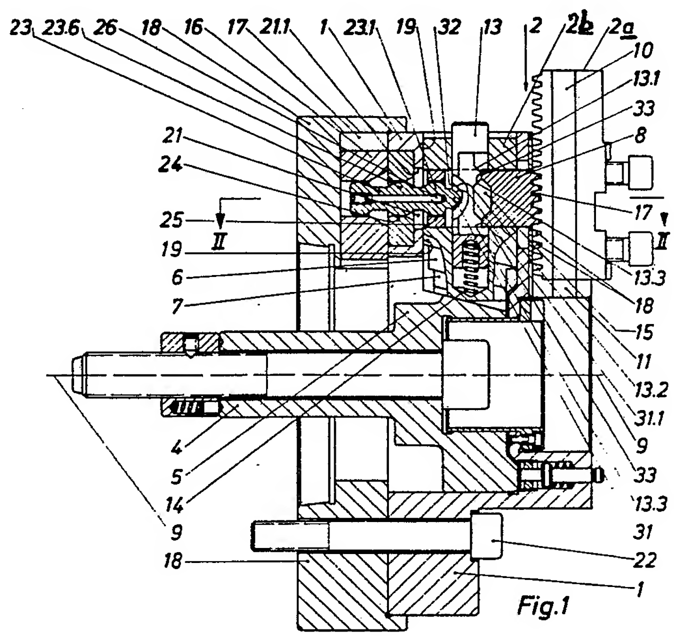

Fig.1

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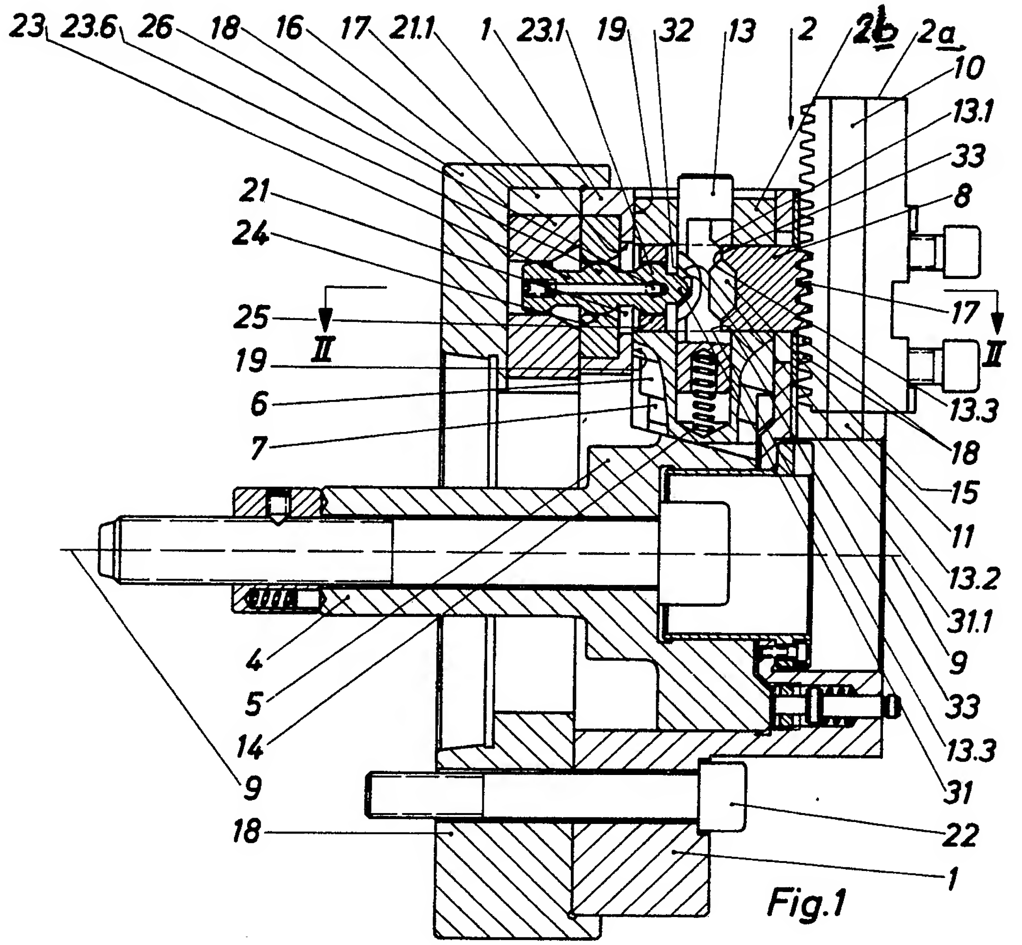
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23.6
26
18
16
17
21.1
1
23.1
19
32
13
2
2b
2a
10
13.1
33
8
21
24
25
II
19
6
7
17
II
13.3
18
15
11
13.2
31.1
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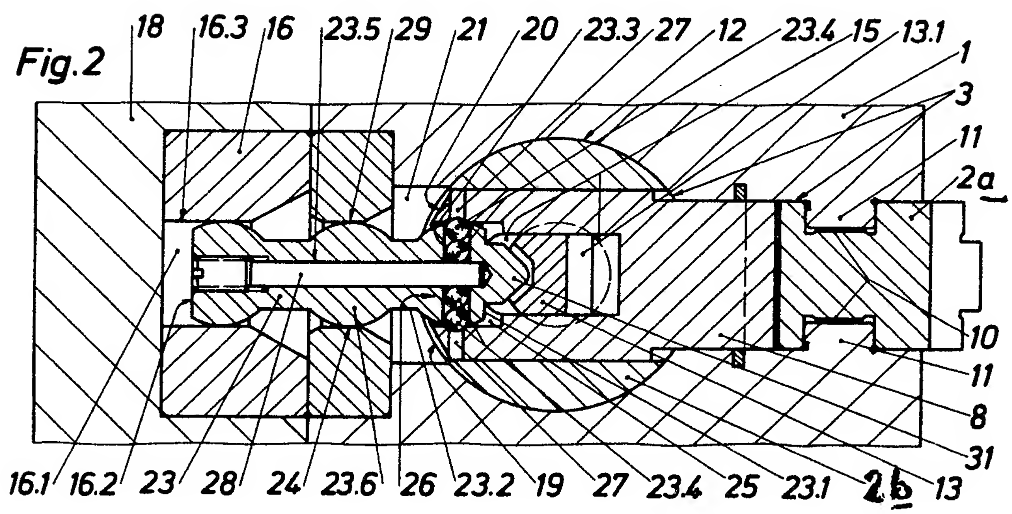
4
5
14
9
33
13.3
31
18
22
1

Fig.1

Fig.2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16.3
16
23.5
29
21
20
23.3
27
12
23.4
15
13.1
1
3
11
2a
10
11
8
31
16.1
16.2
23
28
24
23.6
26
23.2
19
27
23.4
25
23.1
2b
13

SPECIFICATION
Chuck

The invention relates to a chuck comprising clamping jaws which are radially displaceable in the chuck body and which are divided with respect to the chuck axis into an axially forward jaw portion and an axially rearward jaw portion, both of which jaw portions are each independently radially displaceably guided in the chuck body, with only the rearward jaw portion being engaged with a drive member for jaw movement, wherein there is provided an engageable and disengageable coupling slider which is guided on the rear jaw portion parallel to the chuck axis and which in the coupling engaged condition connects the two portions for radial entrainment of the forward jaw portion by the rearward jaw portion and which in the coupling disengaged condition releases the forward jaw portion for radial adjustment independently of the rearward jaw portion and which is positively engaged by a control member for adjustment between the two coupling conditions, the control member being actuable from the exterior and being guided substantially radially movably in the rearward jaw portion and having guide surfaces for the axial positive guiding of the coupling slider.

Chucks of this kind are described in prior applications Nos. P 27 119 04.6-14 and P 28 21 851.1. The advantage of such a chuck is essentially that, solely by moving the coupling slider, it is possible for the two jaw portions to be joined together for the clamping process, or to be separated from each other, if the forward jaw portion is to be replaced or adjusted relative to the rearward jaw portion, for the purposes of changing the chuck clamping diameter. When the two jaw portions are separated from each other and the forward jaw portion is adjusted or replaced, the rearward jaw portion remain unchanged in its position in the chuck body and in particular remains in force-locking and form-locking engagement with the drive member which provides for the radial jaw adjustment movement. In this way, such engagement does not need to be temporarily released for changing the jaws or for changing the chuck clamping diameter. As the engagement between the drive member and the rearward jaw portions is always maintained, but nonetheless the forward jaw portions can be replaced, there is no need for the drive member also to have the possibility of additional movement which would otherwise be required to permit the jaws to be released. More particularly, with the above-mentioned chucks, it is possible for the clamping movement of the drive member to be blocked when the coupling sliders are not fully in the engaged condition, so that the lathe is prevented from starting. For this purpose, at the side of the rearward jaw portion, which is opposite to the forward jaw portion, the chuck body may have an abutment surface for the rearward end face of the slider, which secures the slider in the coupling engaged condition. In the abutment surface, the chuck body has an opening into which, when the rearward jaw portion is in the appropriate position, the coupling slider can axially engage, providing a form-locking engagement in the radial direction, whereby the coupling slider is movable into the fully disengaged condition. The rearward jaw portion is then locked so that it cannot move radially, by way of the slider which has entered the above-mentioned opening, so that, in the result, the drive member which is in form-locking and force-locking engagement with the rearward jaw portion is no longer capable of axial clamping movements. This drive member locking action in turn prevents the lathe from starting, as the lathe rotary drive is not released by way of the movement controlling device which is usually provided for safety reasons for controlling the movement of the drive member. Moreover, in the above-mentioned chucks, the control member is a pin member which can be pressed in radially towards the chuck axis against the force of a spring and which engages through an aperture provided in the coupling slider for permitting the adjustment movement thereof, while in the region of the aperture the pin member carries the guide surfaces for the adjustment movement of the coupling slider, for which purpose the coupling slider bears against the guide surfaces, by way of corresponding guide projections.

U.S. Patent Specification No. 2,729,459 for example also discloses power-operated chucks with clamping jaws which are radially adjustable in the chuck body, wherein centrifugal weights which are substantially radially adjustable on or in the chuck body are provided for compensating for the centrifugal forces acting on the jaws. The centrifugal weights actuate levers which act on the clamping jaws in opposition to the centrifugal force and which are pivotal about axes disposed tangentially with respect to the axis of rotation of the chuck body. The levers each carry a respective one of the centrifugal weights. In this arrangement, the centrifugal weights may be disposed within or outside of the chuck body or a flange which is secured to the rear of the chuck body coaxially with respect to the axis of rotation and which serves to connect the chuck body to the lathe spindle. In particular, the centrifugal weights may have a guide lug whereby the centrifugal weights are freely displaceably guided in radial guide grooves in the chuck body or the flange and the centrifugal weights may be pivotally connected to the lever end which carries them, for which purpose said lever end may be in the form of pivot ball which engages into an opening in the guide lug on the centrifugal weight. The levers are each mounted in the chuck body, with a stationary pivot axis.

Arrangements of this kind for compensating for centrifugal force cannot be readily applied to chucks of the kind set out at the beginning of this specification, because the connection, which is towards the jaws, between the rearward jaw portion and the levers which are actuated by the

centrifugal weights and which act on the clamping jaws in opposition to the centrifugal force gives rise to difficulties, from the point of view of space, by virtue of the coupling slider provided in the chuck and by virtue of the control member which is provided for displacement of the coupling slider, and also because the coupling slider itself does not offer itself for such connection in respect of the levers, because the coupling slider must be displaceable, between the engaged and the disengaged conditions, parallel to the chuck axis, that is to say, virtually in the longitudinal direction of the levers.

The invention is based on the problem of providing a chuck of the kind set out above, with a means for compensating for the centrifugal forces acting on the jaws, in a manner which is simple from the point of view of structure and reliable from the point of view of operation.

According to the invention, this problem is solved by providing the chuck with centrifugal weights which are arranged to move substantially radially on or in the chuck, and levers which are pivotally supported in the chuck body between the centrifugal weights and the chuck jaws and which at one end are engaged by the centrifugal weights and which with the other end counteract the action of centrifugal force on the clamping jaws, the jaw ends of said levers engaging pivotally in mountings at the axially rearward ends of the coupling sliders and being so connected to the coupling sliders that the coupling sliders entrain the levers in the adjusting movement between the two coupling conditions, for which purpose the levers are displaceable both in their supports in the chuck body and also in their connections to the centrifugal weights in the longitudinal direction of the levers, over the axial adjustment distance of the coupling sliders.

The advance achieved by the invention is in substance that, in the chuck according to the invention, in spite of the coupling slider which is guided in the rearward jaw portion, and its control member, the pivotal lever which provides the centrifugal force compensation effect is connected to the rearward jaw portion in a central manner which is extremely beneficial from the point of view of loading, namely, it is connected directly to the coupling slider itself, by virtue of the fact that the pivot axis of the levers is not stationary in the chuck body but is arranged to be displaceable parallel to the chuck axis, so that the levers participate in the axial engagement and disengagement movements of the coupling sliders, and cannot prevent such movement. This also applies when the movement of the coupling slider into the disengaged condition can be permitted, for safety reasons, only when the end of the slider engages into the above-mentioned aperture in the chuck body, to block any further radial jaw movement.

A preferred embodiment of the invention is characterised in that the lever ends which are towards the jaws engage by means of a spherical bearing head into the mountings at the end of the coupling sliders and that the bearing head is held in the mounting by a pivot means with a pivot axis which extends tangentially with respect to the chuck axis. The pivot means ensures that the levers are entrained by the coupling sliders when they are axially displaced between the engaged and the disengaged positions. The spherical enlargement of the bearing head relative to the shank of the lever not only provides advantageous relationships in respect of the radial transmission of force from the lever end to the coupling slider, but also makes it possible, in a particularly simple manner, for the diameter of the coupling slider and the aperture in the chuck body which receives the slider in the disengaged condition, to be made so large that the pivotal movement of the lever shank which passes through the aperture is not prevented by the side wall of the aperture, when the rearward jaw portion is moved radially for clamping purposes. In order to form the pivot axis, the bearing head advantageously has a passage which passes therethrough, coaxially with the pivot axis, and the wall of the mounting has openings which are disposed opposite the orifices of the transverse passage, with balls which are held in the transverse passage engaging into the openings. In order to hold the balls in this condition of engagement, a longitudinal passage which is substantially normal to the transverse passage may open thereinto, and a bar member is inserted into the longitudinal passage until it extends into the transverse passage and presses the row of balls in the transverse passage outwardly and thereby presses the respective outermost ball into the respective opening associated therewith.

The support for the lever in the chuck body, to permit longitudinal displacement of the levers, may be constructed in a particularly simple manner if the lever bears against an annular support surface of the chuck body, by means of a bearing portion which is spherical in the direction of pivotal movement of the lever, the annular support surface extending axially over the path of adjustment movement of the coupling slider and the bearing portion being displaceable against said support surface, parallel to the chuck axis. In order to permit the longitudinal movement of the levers in a particularly simple manner, even with their connection to the centrifugal weights, the invention may further provide that the centrifugal weights are radially displaceably guided on or in the chuck body and each have a mounting for the lever end engaged thereby, wherein the mountings have a substantially cylindrical portion which extends parallel to the chuck axis and into which the lever engaged by means of a substantially spherical bearing head which lies against the wall of the mounting and which is axially displaceable in the mounting by at least the length of adjustment movement of the coupling slider.

If moreover the chuck is one in which the control member engages through an aperture which is provided in the coupling slider, for

permitting the adjustment movement of the slider, and the control member, in the region of the aperture, carries the guide surfaces against which the coupling slider lies by way of guide projections, a preferred embodiment provides that the guide projection for the adjustment of the coupling slider into a disengaged coupling condition, is formed by a nose portion at the lever end towards the jaws, the nose portion projecting through the mounting for the lever and into the aperture in the coupling slider. Thus, by way of the nose portion and the lever connected thereto, the coupling slider is displaced axially and thereby rearwardly into the disengaged coupling condition, by the control member, without any need for the coupling slider itself also to have its own guide projection, for such movement. This generally provides a form of connection between the lever and the coupling slider, which is very simple from the structural and assembly point of view.

The invention is described in greater detail with reference to an embodiment illustrated in the accompanying drawings in which:

Figure 1 shows a view in axial section through a chuck according to the invention, and

Figure 2 shows a view in section taken along line II—II of the chuck of Figure 1, on a larger scale than the view shown in Figure 1.

In the drawing, the chuck body of the chuck is generally denoted by reference numeral 1, and the clamping jaws which are guided radially adjustably in the chuck body are generally denoted by reference numeral 2. For the purposes of guiding the chuck jaws, radial guide grooves generally denoted by reference numeral 3 are provided in the chuck body. Only one jaw is shown in the axial sectional view in Figure 1. However, such a chuck has more than only one jaw, and in general it has three jaws 2. For the purposes of radial movement of the jaws 2, the jaws 2 are in force-locking and form-locking engagement with a drive member 4 which, in the embodiment illustrated, has an axially displaceable drive sleeve 5 which is engaged with the jaws 2 by way of wedge-type or inclined lugs 6 and 7, the lug 6 being disposed on the drive sleeve 5 and the lug 7 being disposed on the jaw 2.

When the drive sleeve 5 is moved towards the left in Figure 1, the jaws are moved radially inwardly, while when the drive sleeve 5 is moved in the opposite axial direction, the jaws are moved outwardly. The drive sleeve 5 may be actuated in the usual manner (which will not be described in great detail herein) by a clamping cylinder unit whose piston may be connected to the drive sleeve 5 through the hollow lathe spindle (also not shown) by way of a traction rod or a traction tube. A power-actuation cylinder unit of this kind may however also be arranged directly in the chuck body 1. The lugs 6 and 7 which are provided in the embodiment illustrated may also be replaced by other known connecting means which produce the drive for the jaws 2 by the drive member 4.

The jaws 2 are divided radially and transversely with respect to the chuck axis 9, in the embodiment illustrated in a plane which is normal to the chuck axis 9, into an axially forward jaw portion 2a and an axially rearward jaw portion 2b. The two jaw portions 2a and 2b are each independently radially adjustably guided in the grooves 3 in the chuck body 1, namely, the forward jaw portion 2a is guided by guide grooves 10 on suitable guide bar portions 11 of the chuck body 1, while the rearward circular-cylindrical jaw portion 2b is guided in guide grooves 12, of a corresponding circular-cylindrical configuration, in the chuck body 1. Of the two jaw portions 2a and 2b, only the rearward jaw portion 2b is engaged with the drive member 4, in the embodiment illustrated therefore the lugs 7 of the drive sleeve 5. The chuck also has an engageable and disengageable coupling member in the form of a coupling slider 8 of substantially circular-cylindrical cross-section, which is guided displaceably parallel to the chuck axis 9 in the rearward jaw portion 2b and which is held rigidly, that is to say, non-displaceably, in the radial direction, to the jaw portion 2b. The coupling slider 8 is provided for rigidly connecting the two jaw portions 2a and 2b for radial entrainment of the forward jaw portion 2a by the rearward jaw portion 2b, when the coupling slider is in the coupling engaged condition as shown in the drawing, while in the axially retracted and therefore disengaged condition (not shown in the drawing), the coupling slider 8 releases the forward jaw portion 2a for the purposes of radial adjustment independently of the rearward jaw portion 2b, so that the forward jaw portion 2a can be completely removed from the radial guide groove 3 and can be replaced by a jaw portion of a different configuration. In contrast, the rearward jaw portion 2b is not interchangeable and always remains in engagement with the drive member 4.

The slider 8 carries a coupling head 17 which, when the slider 8 is in the advanced position, as shown, engages form-lockingly in the radial direction into associated coupling receiving means 18 in the forward jaw portion 2a. The coupling receiving means 18 are formed by a transverse tooth arrangement on the face of the forward jaw portion 2a, which faces towards the rearward jaw portion 2b. The coupling head 17 is provided with a corresponding tooth arrangement which engages into that of the forward jaw portion 2a, as can be readily seen in Figure 1. For the purposes of movement between the engaged and the disengaged condition, the coupling sliders 8 are each positively guided on a control member 13 which can be actuated from the exterior. The control member 13 is in turn guided for substantially radial movement in the rearward jaw portion 2b and has inclined guide surfaces 13.1 and 13.2 for the axial positive movement of the slider 8. More particularly, the control member 13 is a cylindrical pin member which can be pressed radially inwardly towards the chuck axis 9 against

a return force produced by a spring 14 and which engages through an aperture 15 provided in the slider 8 to permit the axial adjustment movement of the slider 8. In the region of the aperture 15, the pin member carries the inclined surfaces 13.1 and 13.2.

At the side of the rearward jaw portion 2b, which is opposite to the forward jaw portion 2a, the chuck body 1 has an abutment surface 19 for the rearward end face 20 of the coupling slider 8. The abutment surface 19 locks the coupling slider in the coupling engaged condition as long as the coupling slider 8 is not positioned precisely opposite an aperture 21 which is provided in the surface 19 and into which the coupling slider 8 can engage axially, so as to provide substantially form-locking engagement in the radial direction, when the rearward jaw portion 2b is in the position illustrated, whereby the coupling slider is axially movable into the disengaged condition. When the slider has entered into the aperture 21, it locks the rearward jaw potion 2b to prevent radial movements thereof, because of the engagement, which is form-locking in this direction, between the slider 8 and the aperture 21, so that in the result the drive member 4 is also no longer capable of axial movements. The lathe can therefore not start if the coupling slider 8 in the disengaged condition has released the connection between the rearward jaw portion 2b and the forward jaw portion 2a at one of the jaws 2.

In the drawing, the control member 13 is shown in its position in which it has not been pressed. It is only in the radially inward pressed position that the control member 13 permits movement of the coupling slider 8 into the coupling disengaged position. In its return movement, under the effect of the return force produced by the spring 14, the control member 13 moves the coupling slider 8 back into the coupling engaged position, by way of the inclined surfaces 13.1. In its un-pressed position, the control member 13 locks the coupling slider 8 which is in the coupling engaged position, by means of radially extending locking surfaces 33 which adjoin the inclined surfaces 13.1 and against which the coupling slider 8 bears, by way of radial abutment surfaces 13.3, as shown in Figure 1. Thus, in this position of the control member 13, there is no possibility of the coupling slider entering the aperture 21 provided therefor in the chuck body 1, when the coupling slider passes the aperture 21 in the course of the radial movement of the rearward jaw portion 2b. The slider 8 can engage into the aperture 21 and can thus move into the coupling disengaged condition only when the control member 13 is pressed in.

In order to compensate for the centrifugal forces which act on the jaws 2a and 2b, the chuck is provided with substantially radially displaceable centrifugal weights 16. Each jaw 2a and 2b has its own centrifugal weight associated therewith, so that only one of the centrifugal weights 16 is shown in Figure 1. In the embodiment illustrated, the centrifugal weights 16 are radially displaceably guided in grooves 17 in the connection flange 18 which connects the chuck body 1 to the machine spindle (not shown) by way of the screw means 22. Provided between the centrifugal weights 16 and the jaws 2 are levers 23 which are pivotally supported at 24 in the chuck body. The levers are engaged at one end by the centrifugal weights 16, while with their other end they press against the jaws 2, in opposition to the centrifugal force. For this purpose, the ends of the levers 23 which are towards the jaws engage into mountings 25 at the axially rearward end of the coupling slider 8, such engagement being pivotal and also being form-locking at least in the radially inward direction, in order to provide for a good transmission of force. In addition, these ends of the levers are so connected to the coupling sliders 8 that the coupling sliders 8 entrain the levers 23 when the sliders 8 move between the two coupling conditions.

This longitudinal movement of the levers 23 is permitted by the levers 23 being displaceable in their longitudinal direction, at least over the axial length of movement of the coupling sliders 8, both in their support 24 in the chuck body 1 and also in their connection to the centrifugal weights 16. More particularly, the ends of the levers which are towards the jaws are in the form of spherical bearing heads 23.1 which are increased in thickness with respect to the lever shank portions 23.2. The aperture 21 in the chuck body 1, which receives the coupling slider 8 for the purpose of locking the rearward jaw portion 2b, is of such a width, corresponding to the diameter of the coupling slider 8, that the wall 21.1 of the aperture 21 does not prevent pivotal movement of the lever 23 which engages therethrough, when the clamping jaw 2 carries out its clamping movement and the lever 23 pivots by virtue of such jaw movement. Entrainment of the lever 23 when the coupling slider 8 is moved axially is achieved by the bearing head 23.1 being held in the mounting 25 of the coupling slider 8, by a pivot means 26 whose pivot axis extends tangentially with respect to the chuck axis 9. The pivot axis is formed by the bearing head 23.1 having a passage 23.3 which passes therethrough, coaxially with the pivot axis. The wall of the mounting 25 has openings 27 which are disposed opposite the orifices of the transverse passage and which, for the sake of simplicity, are also formed by the orifices of a passage. Balls 23.4 which are held in the transverse passage 23.3 engage into the openings 27. Such engagement of the balls 23.4 in the openings 27 is ensured by a longitudinal passage 23.5 which opens into the transverse passage 23.3 and into which there is inserted a bar member 28, from the end of the lever which is connected to the centrifugal weights 16, the bar member 28 extending into the transverse passage 23.3. The bar member 28 urges the row of balls 23.4 in the transverse passage 23.3 outwardly

and thereby urges the respective outermost ball into the respective associated opening 27.

The lever 23 has a bearing portion 23.6 which is spherical in the direction of pivotal movement of the lever and which bears against an annular support surface 29 of a bearing ring 30 which is fixedly inserted into the chuck body 1. The support surface 29 extends axially over the path of movement of the coupling slider 8 and the bearing portion 23.6 is displaceable on the support surface 29, parallel to the chuck axis 9. If portion 23.6 is of circular cross-section, then the support surface 29 is generally in the form of a cylindrical surface. In order to ensure that the levers 23 are also displaceable, in regard to their connection to the centrifugal weight 16, the centrifugal weights 16 each have a respective mounting 16.1 for the lever end connected thereto. The mountings 16.1 have a substantially cylindrical portion which extends parallel to the chuck axis 9 and which the lever 23 is engaged with a bearing head 23.7 which is formed as part of a sphere. The head 23.7 bears against the wall 16.3 of the mounting 16.1 and is displaceable in the mounting 16.1 axially over at least the length of movement of the coupling slider 8. In order to achieve the shortest possible dimensions in the axial direction, in this arrangement, the head 23.7 may be axially shortened to a spherical-segment plane 16.2.

So that the coupling slider 8 can be moved into the disengaged condition, by depressing the control member 13, the control member 13 has an inclined guide surface 13.2 on the side which is towards the lever 23. The guide projection associated with the guide surface 13.2 is formed by a nose portion 31 on the end of the lever which is towards the jaws. The nose portion 31 projects through the mounting 25 for the lever end, into the aperture 15 of the coupling slider 8. If therefore the control member 13 is depressed against the force of the spring 14, the lever 23 is first pushed back axially by way of the guide surface 13.2 and the nose portion 31 with associated inclined surface 31.1, the lever 23 entraining the coupling slider by way of the pivot connection formed by the balls 23.4 and thereby moving the coupling slider 8 into the coupling disengaged condition, as at the same time the locking action thereon, which is produced by the locking surfaces 33, is removed, for the inclined surfaces 13.2 engage the nose portion 31 of the lever 23 only when the surfaces 33 have moved out of the region of the slider abutment surfaces 13.3. For this purpose, a suitable idle-movement distance 32 is provided between the nose portion 31 and the inclined surfaces 13.2.

Claims

1. A chuck comprising clamping jaws which are radially displaceable in the chuck body and which are divided with respect to the chuck axis into an axially forward jaw portion and an axially rearward jaw portion, both of which jaw portions are each independently radially displaceably guided in the chuck body, with only the rearward jaw portion being engaged with a drive member for jaw movement, wherein there is provided an engageable and disengageable coupling slider which is guided on the rear jaw portion parallel to the chuck axis and which in the coupling engaged condition connects the two jaw portions for radial entrainment of the forward jaw portion by the rearward jaw portion and which in the coupling disengaged condition releases the forward jaw portion for radial adjustment independently of the rearward jaw portion and which is positively engaged by a control member for adjustment between the two coupling conditions, the control member being actuable from the exterior and being guided substantially radially in the rearward jaw portion and having guide surfaces for the axial positive guiding of the coupling slider, the chuck further comprising centrifugal weights which are arranged to move substantially radially on or in the chuck, and levers which are pivotally supported in the chuck body between the centrifugal weights and the chuck jaws and which at one end are engaged by the centrifugal weights and which with the other end counteract the action of centrifugal force on the clamping jaws, the jaw ends of said levers engaging pivotally in mountings at the axially rearward ends of the coupling sliders and being so connected to the coupling sliders that the coupling sliders entrain the levers in the adjusting movement between the two coupling conditions, for which purpose the levers are displaceable both in their supports in the chuck body and also in their connections to the centrifugal weights, in the longitudinal direction of the levers, over the axial adjustment distance of the coupling sliders.

2. A chuck according to claim 1, in which the jaws ends of the levers engage by means of spherical bearing heads into the mountings at the ends of the coupling sliders and in which each bearing head is held in its mounting by a pivot means with its axis extending perpendicularly with respect to the chuck axis.

3. A chuck according to claim 2, in which to form the pivot axis, each bearing head has a transverse passage which extends therethrough and the wall of the associated mounting has openings disposed respectively opposite the ends of the transverse passage and into which engage balls at the ends of a row of balls held in the transverse passage.

4. A chuck according to claim 3, in which a longitudinal passage which is substantially normal to the transverse passage opens into the transverse passage, and a bar is inserted into the longitudinal passage and into the transverse passage, which bar divides the row of balls in the transverse passage and thereby presses the two respective outermost balls into the respective openings in the associated mounting.

5. A chuck according to any one of claims 1 to 4, in which each lever bears by means of a spherical bearing portion on an annular support surface of the chuck body, the support surfaces

extending axially over the path of movement of the associated coupling slider and the bearing portion being displaceable along the support surface, parallel to the chuck axis.

6. A chuck according to any one of claims 1 to 5, in which the centrifugal weights each have a mounting for the associated lever end, the mountings each having a substantially cylindrical portion which extends parallel to the chuck axis and which engages a substantially spherical bearing head on the lever, the bearing head being displaceable axially by at least the length of the adjustment movement of the coupling slider in the mounting.

7. A chuck according to any one of claims 1 to 6, in which each control member extends through an aperture in the associated coupling slider, for permitting the adjustment movement of the slider, and the control member, in the region of the aperture, carried the guide surfaces against which guide projections on the coupling slider bear, the guide projection for the adjustment of the coupling slider into the disengaged coupling conditions being formed by a nose portion at the jaw end of the lever which projects through the mounting for the lever end into the aperture in the coupling slider.

8. A chuck substantially as herein described with reference to the accompanying drawings.

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US-CL-CURRENT: 279/123 , 279/130

ABSTRACT:

CHG DATE=19990617 STATUS=O> The centrifugal force on chuck jaws 2 is counteracted by balance weights 16 acting through levers 23 each formed with three spherical surfaces respectively engaging a cylindrical surface 16.3 in the weight, a support surface 29 fixed in the chuck and a mounting 25 in a slider 8 in a portion 2b of the jaw 2. The slider 8 has teeth 17 engaging a forward portion 2a of the jaw. To disengage the

portion 2b, enabling the portion 2a to be withdrawn from the chuck, a member 23 is depressed to withdraw the slider 8 by cam action from the portion 2a while the lever slides through the surfaces 16.3 and 29. A spring 14 effects the return movement. End balls in a row thereof in a transverse passage in lever bearing head 23.1 provide a pivot in mounting 25. The jaws 2 are moved radially by a drive member 4 acting through ramps 6, 7 only on portion 2b.